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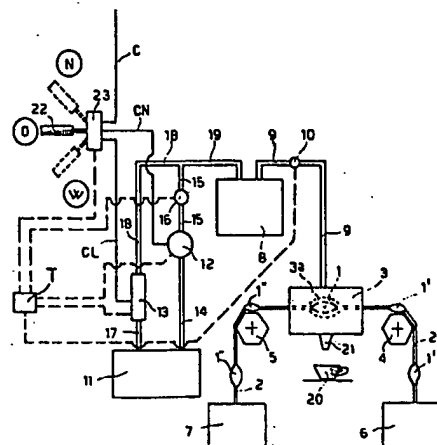
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Improvements in an express coffee machine for brewing coffee from coffee pods.

An express machine has a coffee brewing chamber, (3a) a water reservoir (11) and a water heater (8) and two electrical pumps (12,13) are provided: one capable of supplying a smaller quantity of water from the reservoir via the heater to the brewing chamber so as to make a regular-strength coffee beverage, and the other capable of supplying a considerably larger quantity of water from the reservoir via the heater to the brewing chamber, so as to make a weaker-strength coffee beverage from an identical quantity of coffee. A selector (22, 23) at the outside of the machine allows a user to select which one of the pumps he wishes to energize (the sole figure is referred to).



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Improvements in an express coffee machine for brewing coffee  
from coffee pods.

The invention relates to improvements in an express coffee machine for brewing coffee from coffee pods.

The prior art comprises several machines for brewing coffee  
5 from a coffee pod or from a coffee pad pressed in a filter.  
The applicant is the owner of the European Patent Application  
N° 79101760.1 relating to a coffee machine for brewing coffee  
by passing hot water through a coffee pod.

10 Coffee machine are known which supply cups of coffee of  
constant volume and strength and others which, on demand,  
supply cups of coffee of different volumes and strengths by  
varying the quantity of water which is made to pass through  
a coffee pod or by using filters of different characteristics.

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Let it be assumed, for purposes of the explanations here-  
after, that the term "standard coffee" refers to an express  
coffee of standard volume, e.g. an express coffee of Italian  
type made by passing about 40 cc of hot water through a  
20 predetermined quantity of ground coffee beans in a pod or in

a coffee pad pressed in a filter. Let it further be assumed that the term "weak coffee" refers to an express coffee made by passing a substantially higher quantity of hot water, e. g. about 120 cc, through an identical quantity of ground  
5 coffee beans. Of course, these quantities and the relations between them are arbitrary and intended only to facilitate explanations.

The prior - art variable - volume coffee machines have  
10 several disadvantages. Chief among these are the fact that the beverage which results when the water volume is changed will vary not only in quantity, but also in taste and appearance (the creamy, foamy appearance of typical "expresso") and also that brewing of a "weak coffee" requires a  
15 preparation time which is much longer (as much as 3-4 times longer) than the time required for preparation of the "standard" coffee.

The invented improvements overcome the disadvantages of the  
20 prior art and are the result of experimentations made by the inventor which led to an express coffee machine provided with two different pumps, a rotary pump and a reciprocating pump able to work alternatively for pumping conveniently heated water through a coffee pod; it was found that a  
25 convenient rotary pump delivering a standard coffee in a normally accepted time period may be associated in the machine with a certain convenient reciprocating pump that delivers a weak coffee in a time period not much longer than the rotary one, the latter coffee so having a taste and an  
30 appearance still equal to those of standard coffee.

The main advantage of the invented improvements resides in that, by using a same machine, it is possible to get in quite equal time periods alternatively standard coffees or weak coffees having the same taste and appearance.

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One way of carrying out the invention is described in detail below with reference to a diagrammatic drawing which illustrates only one specific embodiment.

- 10 The machine illustrated in the figure brews each beverage to be dispensed from a fresh coffee pod 1. Such pods are known from the prior art and are essentially small quantities of powdered or granulated coffee bean material, which may be compressed and is contained in a water-permeable
- 15 cover. In the present instance this cover is a tape 2 of filter cloth, filter paper or the like, in which the pods 1 are incorporated at identical intervals. A supply container 6 for fresh pods 1' and a container 7 for used pods 1" are provided. The tape is placed over polygonal drums 4, 5 which
- 20 turn about axes normal to the plane of the Figure, so that the pods 1' are sequentially pulled out of the container 6, introduced (as pods 1) into brewing chamber 3a of brewing element 3, and then deposited as used pods 1" in the container 7. In container 6 the tape may be stored by rolling up, zig-
- 25 zag folding, or in any other manner. One or both of the drums 4, 5 may be driven; the drive itself is known per se.

A water reservoir 11 contains a supply of water and is connected with a water heater 8 via two conduit branches.

- 30 One of these is composed of conduits 14, 15 and 19; the

other of conduits 17, 18 and 19. Interposed in the conduits 14, 15 is a first pump 12 which is in form of a rotary pump, for example of the type commercially available under the tradename "Procon" from Standex International GmbH in Krefeld, Federal Republic of Germany. Interposed in the conduit 18 is a second pump 13 which is, however, a reciprocating pump, for example of the plunger type available commercially under the tradename "Turmix" from Turmix A.G. of Rapperswill-Jona, Switzerland. Each of the pumps 12, 13 is connected with and has its length of operation controlled by a multi-cam timer T (known per se). A solenoid valve 16 is interposed in conduit 15 downstream of the pump 12. Conduit 19 is connected with the water heater 8; an outlet conduit 9, in which a solenoid valve 10 is interposed, connects the water heater 8 with the brewing chamber 3a. Water is heated in water heater 8 by a not-illustrated (known-per-se) electric resistance heating element; the internal temperature and pressure in the water heater 8 are controlled by a thermostat and valve (not shown), both known per se.

The brewing element 3 is provided with an outlet 21 for brewed coffee beverage originating in the brewing chamber 3a. A user places a cup or other receptacle 20 beneath this outlet 21 before operating the machine.

A lever 22 provided with a handle is mounted on a switch 23 so as to be accessible at the exterior of the machine. Lever 22 can be moved between a neutral position 0 in which the machine is shut off, a position N into which it is placed

when "normal" coffee is to be brewed, and a position W into which it is placed when "weak" coffee is desired. When in position N, lever 22 closes an electrical circuit between a current-supply line C and the internal electric line which feeds the pump 12, thereby actuating the pump 12 through the multi-cam timer. In position W the lever 22 closes the circuit between the line C and line CL which feeds pump 13, thus actuating the latter pump.

10 In operation, and assuming that the machine is ready to work, that a fresh pod 1 is located in chamber 3a and that a user desires to obtain "normal" coffee, the user places the lever into the position N. This causes solenoid valves 10 and 16 to open (their electrical connections for this purpose are also known per se and hence not shown) and the pump 12 to be energized. The pump 12 now pumps nearly 40 cc of water from reservoir 11 into the water heater 8; at the same time, an equal quantity of the already hot water contained therein is displaced out of the water heater 8 and forwarded via conduit 9 into the brewing chamber 3a. The working period of pump 12 is controlled by timer T which shuts the pump down when 40 cc (or nearly 40 cc) of water have been pumped and valves 10, 16 close. The hot water passes through pod 1 and brews "normal" strength coffee which runs off through outlet 21.

At the end of the cycle, when the pump 12 stops and the solenoid valves 10, 16 close again, the spring-loaded lever 22 returns to the neutral position O, and the drums 4, 5 turn to transport the used pod 1" out of chamber 3a and a

fresh pod 1' into the chamber.

By this time the new (cold) water pumped into the water heater 8 by pump 12 has already been heated to the correct  
5 temperature, since the heating element is so dimensioned as to require only seconds for this purpose. If, now, another user comes along who prefers "weak" coffee, he can move the lever 22 to the position W. The previous cycle is then repeated, but with the difference that the solenoid valve  
10 16 remains closed and that it is the pump 13 which is energized, rather than the pump 12. Pump 13 pumps nearly 120 cc of water from reservoir 11 into heater 8, and displaces the same quantity of hot water from heater 8 via conduit 9 into the chamber 3a. Again, the working time of  
15 pump 13 is controlled by its associated timer.

The time required for passing the nearly 120 cc of hot water through the pod 1 in chamber 3a, to brew a "weak" coffee beverage, is about 4, 5 seconds. This is only a few seconds  
20 longer than the time required to brew the "normal" beverage, so that the pronounced time differential in brewing the different - strength beverages is avoided. Moreover, the taste (but not the strength) of the weaker coffee, and its appearance, are the same as for the "normal" beverage, so  
25 that the machine according to the invention assures one and the same piece of equipment is capable of dispensing "normal" and "weak" coffee brews of the same taste and appearance and in essentially the same time periods.

## Claims:

1. Improvements in an express coffee machine for brewing coffee from coffee pods comprising means defining a brewing  
5 chamber having an outlet for brewed coffee and being adapted to receive coffee pods; a water reservoir; means for heating water operatively connected with said brewing chamber; pump means connected with said reservoir and heating means; conduit means connecting said reservoir and water heating  
10 means with said brewing chamber; said pump means being interposed in said conduit means characterized in that a coffee machine is provided with two pump means, one of said pump means comprising a rotary pump and the other of said pump means comprising a reciprocating pump, said rotary and  
15 reciprocating pumps being such that they pump alternatively water through a coffee pod in a brewing chamber in the machine.

2. Improvements as claimed in claim 1 characterized in  
20 that a coffee machine is provided with control means for selectively energizing a rotary pump and a reciprocating pump and is provided with a user-operable activating means electrically connected with said control and pump means and accessible at the outside of said coffee machine for  
25 enabling a user to selectively energize one or the other of said rotary and reciprocating pumps.

3. Improvements as claimed in claims 1 and 3 characterized in that the rotary pump forwards, when energized, a first  
30 quantity of water from said reservoir to said heating means



and a corresponding quantity of heated water from said heating means to said brewing chamber; the reciprocating pump forwards, when energized, a second larger quantity of water from said reservoir to said heating means and a  
5 corresponding quantity of heated water from said heating means to said brewing chamber.

4. Improvements as claimed in claims 1, 2 and 3 characterized in that said reciprocating pump being operative  
10 for forwarding said second quantity of water in a time period insubstantially longer than the time period required by said rotary pump to forward said first quantity of water and being dimensioned to forward said second quantity of water which is approximately triple said first quantity of water.

15  
5. Improvements as claimed in claims 1, 2 and 3 characterized in that said rotary pump being operative for forwarding a first quantity of water suitable to brew a standard express coffee and in that said reciprocating pump being operative  
20 for forwarding a second quantity of water suitable to brew a weak express coffee.

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European Patent  
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# EUROPEAN SEARCH REPORT

0041657

Application number  
EP 81 10 4104

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
D	<u>FR - A - 1 563 536</u> (EVECO TRUST REG.)  * The whole document * ---	1,5	A 47 J 31/40 A 47 J 31/36
	<u>FR - A - 1 604 659</u> (EGI S.R.L.)  * Page 1, lines 16-19; figure 1 * ---	1,5	
	<u>US - A - 3 370 523</u> (WRIGHT)  * The whole document * ---	1	
	<u>EP - A - 0 006 175</u> (ILLYCAFFE)  * The whole document *  -----	1	TECHNICAL FIELDS SEARCHED (Int. Cl.)  A 47 J G 07 F B 67 D
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
<input checked="" type="checkbox"/> The present search report has been drawn up for all claims			&: member of the same patent family. corresponding document
Place of search  The Hague		Date of completion of the search  16.09.1981	Examiner  SCHARTZ